

REMARKS

The Office Action dated July 1, 2002 has been received and carefully studied.

The Examiner objects to the Abstract because it is too lengthy. By the accompanying amendment, the Abstract has been shortened.

The Examiner objects to claims 4-19 under 37 C.F.R. §1.75(c) as being improper multiple dependent claims. By the accompanying amendment, the improper dependencies have been removed.

The Examiner rejects claim 20 under 35 U.S.C. §112, first paragraph as being non-enabling. The Examiner states that the specification does not provide reasonable enablement for the use of any urethane oligomer, any unsaturated polycarboxylic acid resin, any thermoplastic polymer and any curing agent that contains any thermosetting component. The Examiner also rejects claim 20 under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner objects to the terms "type" and "principal".

By the accompanying amendment, claim 20 has been cancelled.

The Examiner rejects claims 1-3 under 35 U.S.C. §112, second paragraph, as being indefinite. By the accompanying amendment, claim 1 has been amended to clarify that the salt is of the urethane oligomer. Claim 2 has been amended to provide proper antecedent basis for the term objected to.

The Examiner rejects claims 1-3 under 35 U.S.C. §112, first paragraph as being non-enabling. The Examiner essentially requires that the claims specify that the polyol, anhydride and polyisocyanate be reacted before reaction with the hydroxy compound, since the specification provides enablement only for that reaction sequence.

By the accompanying amendment, claim 1 has been amended to recite that the polyol compound is reacted with a polybasic acid anhydride, a polyisocyanate and a hydroxy compound successively. It is believed that the amendment overcomes the rejection.

The Examiner rejects claims 1-3 under 35 U.S.C. §102(b) as being anticipated by JP 06206956. The Examiner considers the urethane (meth)acrylate to fall within the scope of the urethane oligomer of claim 1.

The rejection is respectfully traversed.

JP '956 discloses that the compound (c) having at least one carboxyl group and at least two hydroxy groups, which is used as a material of the urethane (meth)acrylate, is produced for example by reacting a polyol compound (a) having 3 or more functional groups with a polybasic acid anhydride such as an anhydride of succinic acid, maleic acid, adipic acid and tetrahydrophthalic acid (see paragraph 6 of the reference (translation enclosed)). The polybasic acid anhydride disclosed as examples in the reference are only an anhydride of dicarboxylic acid such as succinic acid, maleic acid, adipic acid and tetrahydrophthalic acid. That is, in the reference, only a polybasic acid anhydride having only one acid anhydride group is concretely disclosed. In the reaction of polyol compound (a) with the polybasic acid anhydride having only one acid anhydride, polymerization does not occur. In the reference, when the compound (c) is reacted with a polyisocyanate, a polymer is produced by polycondensation of isocyanate groups and carboxyl group. Thereafter, the polymer is reacted with a hydroxy-containing (meth)acrylate to obtain a urethane (meth)acrylate.

In contrast, in the present invention, a polybasic acid anhydride having two acid anhydride groups is used. When the polybasic acid anhydride having two acid anhydride groups is reacted with a polyol compound, a polymer (a carboxyl group-containing terminal alcohol compound) is clearly different from the reference compound (c) which is not a polymer.


The polymer of the present invention is successively reacted with a polyisocyanate and then an ethylenically unsaturated group-containing hydroxyl compound to obtain a urethane oligomer. The resulting oligomer is clearly different in structure from the urethane (meth)acrylate of the cited

reference.

Furthermore, the cured film obtained by using the present oligomer has excellent properties, especially its soldering-heat resistance, flexibility, heat-deterioration resistance and non-electrolytic gold-plating resistance. The cited reference nowhere discloses or suggests the present oligomer used to obtain the cured film having these excellent properties.

Reconsideration and allowance are respectfully requested in view of the foregoing.

Respectfully submitted,


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Version with Markings to Show Changes Made

In the specification:

Page 68, paragraphs 1-3:

The present invention relates to a new urethane oligomer (A) [is intended to provide a resin] and a resin composition comprising (A) and an unsaturated group containing polycarboxylic acid resin (B) that can be diluted with water and is excellent in providing a cured product [(curing, adhesion, and water resistance); a resin composition] and that is suitable for a solder resist and an interlayer dielectric layer because the cured product is excellent in flexibility, soldering-heat resistance or the like and allows a development with an organic solvent or a dilute alkali solution; a photosensitive resin composition suitable for an etching resist or a cover lay; and a photosensitive film obtained thereby.

[A urethane oligomer (A) obtained by reacting a polyol compound (a) with a polybasic acid anhydride (b-1) having at least two acid anhydride groups per molecule, a polyisocyanate compound (c), and a hydroxy compound having ethylenically unsaturated groups; and

A resin composition and a photosensitive film comprising (1) the above oligomer (A); (2) one or more resins selected from an unsaturated group-containing polycarboxylic acid (B), a reactive diluent (C-1) such as (meth)acrylates, an unreactive diluent (C-2) such as carbitol acetate and a thermoplastic polymer (D); and (3) a photopolymerization initiator.]

In the claims:

1. (Amended) [An] A urethane oligomer (A) or the salt thereof obtained by reacting a polyol compound (a) with a polybasic acid anhydride (b-1) having [at least] two acid anhydride groups per molecule, a polyisocyanate compound (c)[,] and a hydroxy compound having ethylenically unsaturated

groups, successively [and the salt thereof].

2. (Amended) [An] A urethane oligomer (A) according to Claim [(1)] 1, wherein said polybasic acid anhydride [(b)] (b-1) having at least two acid anhydride groups per molecule has an acid value of 200-1500mgKOH/g and the salt thereof.

3. (Amended) [An] A urethane oligomer (A) according to [Claim (1) or (2)] claim 1 or 2, wherein said urethane oligomer (A) has a weight-average molecular weight of 1,000-100,000; and the salt thereof.

4. (Amended) [An] A urethane oligomer (A) according to [any of Claim (1) to (3)] claim 1, wherein said urethane oligomer (A) has an acid value of 1-200mgKOH/g and the salt thereof.

5. (Amended) A resin composition comprising [an] a urethane oligomer (A) according to [any of Claim (1) to (4)] claim 1 and an unsaturated group-containing polycarboxylic acid resin (B) that is a product obtained by reacting an epoxy resin (e) having at least two epoxy groups per molecule with a monocarboxylic acid compound (f) having ethylenically unsaturated groups and a polybasic acid anhydride (b-2).

7. (Amended) A resin composition comprising [an] a urethane oligomer (A) according to [any one Claim (1) to (4)] claim 1 and a thermoplastic polymer (D).

8. (Amended) A resin composition according to [Claim (5) or (6)] claim 5, comprising a diluent (C).

9. (Amended) A resin composition according to [Claim (7) or (8)] claim 5, further comprising a diluent (C), and wherein said diluent (C) is a reactive diluent (C-1).

10. (Amended) A resin composition according to [any of Claim (5) to (9)] claim 5 comprising a photopolymerization initiator (E).

11. (Amended) A resin composition comprising [an] a urethane oligomer (A) according to

[any of Claim (1) to (4)] claim 1, a thermoplastic polymer (D) and a photopolymerization initiator (E).

13. (Amended) A resin composition according to [any of Claim (1) to (10)] claim 5 comprising a thermoplastic component (F).

14. (Amended) A resin composition according to [any of Claim (5) to (13)] claim 5, wherein said resin composition is prepared for the solder resist in a printed circuit board or for an interlayer dielectric layer.

15. (Amended) A photosensitive film comprising being prepared by laminating the layer of a resin composition according to [any of Claim (10) to (14)] claim 5 on a supporting film.

17. (Amended) A cured product of the resin composition according to [any of Claim (5) to (16)] claim 5.

20. (Cancelled)